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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _24 November 2009_.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-16_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-16_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _19 May 2006_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____ .

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____ .

DETAILED ACTION

Claim Objections

1.   The previously made claim objections to Claim 10 are hereby withdrawn in view

of amendments to the claims submitted on 24 November 2009. However a new

objection is being made to Claim 12 for a spelling mistake "decreaseing".

Claim Rejections - 35 USC § 112

2.   The previously made 112 2nd paragraph rejections to claims 1-15 are hereby

withdrawn in view of amendments to the claims submitted on 24 November 2009.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 1-6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Barnitz et al (US Patent 5,795,328 A) in view of Gehm et al (US Patent 6,045,331

A)

5.   In Re Claims 1 and 2, Barnitz et al discloses a method for controlling (36) a drive

motor (16) of a positive displacement type (Column 5, Line29: "pump 14 is a rotary vane

pump" which is well known as a type of positive displacement pump – also as

acknowledged in applicant's disclosure) vacuum pump (14), comprising:

●   determining the inlet pressure p through pressure signals in the inlet line (12)

read by pressure sensor (22)

●   operating the motor at a constant upper speed when the pressure values are in

an upper range as suggested in Column 5, Lines 36-39: "pump 14 may be temporarily

operated, for example at the start up of system 10, at maximum capacity, greater than

500 mm. of mercury, in order to reach more quickly a desired operating vacuum

pressure in vacuum line 12". Maximum capacity of the pump implies maximum speed

for the drive motor which is a constant value. Therefore for pressures greater than 500

mm, the pump is driven at a constant upper speed value.

●   operating the motor at a constant lower speed when the pressure values are in a

lower range as stated in Column 4, Lines 45-49: "To produce or to maintain a pressure

in vacuum line 12 higher then 100 mm. of mercury--that is, between 0 and 100 mm. of

mercury--pump 14 is operated at a CONSTANT SPEED, sufficient, in the absence of

any effect of pressure adjusting assembly 20, to maintain a pressure of 100 mm. of

mercury in the vacuum line". Therefore for pressures less than 100 mm, the pump is

driven at a constant lower speed value.

●   operating the motor in an alteration range of inlet pressure values between 100

mm and 500 mm, by varying the speed of the motor. The operating speed of the motor

depends on the pressure sensed by sensor (22) as suggested in Column 4, Lines 54-58: "To produce or to maintain a pressure in the vacuum line 12 less than 100 mm. of mercury--for example, between 100 and 500 mm. of mercury--valve 34 is closed and the speed of pump 14 is VARIED to adjust the pressure in the vacuum line to the desired value"

6.   It is clear that any value read by the sensor between 100 mm and 500 mm will have a corresponding speed that the motor is operated at, however, Gehm et al does not explicitly disclose determining the speed associated with the inlet pressure.

7.   Nevertheless, Gehm et al discloses a fluid pump speed controller with self calibration which determines the value of vacuum pressure for each value of speed in a range of operating speeds. The pump is run at full speed and then SLOWED down in 1 HZ increments every 10 seconds until a 0.2" Hg DROP in vacuum level is recorded (Column 4, Lines 17-23).

8.   It would have been obvious to a person having ordinary skill in the art at the time of the invention to calibrate a curve that relates the inlet pressure to the speed that the motor of Barnitz et al should be operated at as suggested by Gehm et al and adjust the speed to the appropriate value corresponding to the desired value of pressure for the purpose of adjusting the pressure in the vacuum line to the desired value.

9.   Note further, that PID controllers are well known in the art and can be used to vary the speed of the Barnitz et al pump to obtain the desired pressure in the vacuum line. For the basics on PID control theory, visit the following website on the web - http://en.wikipedia.org/wiki/PID_controller which describes a process variable,

manipulated variable and setpoint. In the instant application, the process variable is the inlet pressure, the manipulated variable is the speed and the setpoint is the desired value of the process variable. The teachings of Gehm et al clearly disclose specific speeds associated with specific inlet pressures (steady state) and that higher vacuum requirements require higher speeds. A proportional controller changes the speed to a value proportional to the difference between the observed inlet pressure and desired inlet pressure (error). Therefore, as the inlet pressure approaches the desired pressure the speed is also adjusted accordingly by the controller. Therefore there is a different speed value associated with different inlet pressure values. Decisions based on error are also made by the derivative and integral controllers. The PID controller also helps reach the final pressure more rapidly.

10.   Note the following additional disclosures of Gehm et al: "vacuum pumps that have a minimum allowable operating speed" – Column 2, Line 25. Gehm et al also discloses a first setpoint where pump is operated at minimum speed (reads on constant lower speed value), and a third setpoint where the pump is operated at the maximum speed for the electric motor (reads on constant upper speed value). The maximum speed is for pressure values larger than an upper limit pressure and the minimum speed is for pressure values lower than a lower limit pressure. Anything in between is for occasional transients.

11.   In Re Claim 3, Barnitz et al and Gehm et al as applied to Claims 1 and 2 disclose all the claimed limitations.

12.   In Re Claim 4 and 12, since the pump of Barnitz et al is operated at constant

speed between 0 and 100 mm of Hg (mercury), all speeds of operation between 100

mm and 500 mm are greater than this minimum constant speed. Further, Column 4,

Lines 17-23 of Gehm et al states that the slowing down of the motor causes a drop in

vacuum level, suggesting that each value of decreasing speeds are associated with a

corresponding value of decreasing inlet pressure.

13.   In Re Claims 5 and 6, it would have been obvious to a person having ordinary

skill in the art to operate the speeds in the claimed ranges at the pressures in the

claimed ranges since it has been held that where the general conditions of a claim are

disclosed in the prior art, discovering the optimum or workable ranges involves only

routine skill in the art – MPEP 2144.05 (II-A).

14.   Claims 7, 8, 10, 11, 13, 14 and 16 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Barnitz et al (US Patent 5,795,328 A) in view of Gehm et al (US

Patent 6,045,331 A) and further in view of Rousseau et al (US Patent 6,419,455 B1)

15.   In Re Claim 7, Barnitz et al modified by Gehm et al as applied to Claim 1

discloses all the claimed limitations except for a high vacuum pump arranged

downstream from the positive displacement pump. (Since the sensor and the positive

displacement pump are both disposed on the suction side of a would be modification of

a high vacuum pump, the inlet pressure is read on the suction side of the high vacuum

pump.)

16.   Nevertheless, Rousseau et al discloses a primary pump (4) and a secondary

pump (5) disposed upstream of the primary pump. Column 4, Lines 38-39 of Rousseau

et al state that the secondary pump can also be a Roots pump (positive displacement

pump). Rousseau et al also discloses a pressure sensor (7) upstream from the

secondary pump and a pressure sensor (7') upstream from the primary pump.

17.   It would have been obvious to a person having ordinary skill in the art at the time

of the invention to add a high vacuum pump as taught by Rousseau et al downstream

from the rotary vane pump of Barnitz et al for the purpose of enhancing the pumping

capability of the vacuum apparatus.

18.   In Re Claim 8, Rousseau et al discloses an automation card that can include

mathematical rules between pressures and parameters which govern the instantaneous

speed profiles (Column 5, Lines 35-40). The relationship between pressure and speed

can be stored on this card and be used to determine values of speed corresponding to

inlet pressure.

19.   In Re Claim 10, the apparatus of Barnitz et al modified by Gehm et al and

Rousseau et al performs the method of claims 1, 2, 7 and 8. In accordance with MPEP

2112.02, under the principles of inherency, if a prior art device, in its normal and usual

operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device.

20.   In Re Claim 11, Barnitz discloses a processor (38) that processes and evaluates the pressure signal from the sensor.

21.   In Re Claim 13, Barnitz et al modified by Gehm et al and Rousseau et al as applied to Claims 3 and 7 disclose all the claimed limitations.

22.   In Re Claim 14, Barnitz et al modified by Gehm et al and Rousseau et al as applied to Claims 3 and 8 disclose all the claimed limitations.

23.   In Re Claim 16, Barnitz et al modified by Gehm et al and Rousseau et al as applied to Claims 7 and 10 disclose all the claimed limitations.

24.   Claims 9 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnitz et al (US Patent 5,795,328 A) in view of Gehm et al (US Patent 6,045,331 A) and further in view of de-Simon et al (US Patent 5,971,725 A)

25.   In Re Claim 9, Barnitz et al modified by Gehm et al as applied to Claim 1

discloses all the claimed limitations except for an asynchronous motor to power the

pump.

26.   Nevertheless, de-Simon et al discloses in Column 5, Lines 24-25 that a vacuum

pumping device incorporates a 3 phase AC asynchronous motor.

27.   It would have been obvious to a person having ordinary skill in the art at the time

of the invention to use an asynchronous motor as taught by de-Simon et al to drive the

pump of Barnitz et al as a suitable design choice due to its successful application in the

prior art. If the modification leads to anticipated success, it is likely the product of

ordinary skill and common sense and not the product of innovation.

28.   In Re Claim 15, Barnitz et al modified by Gehm et al and de-Simon et al as

applied to Claims 3 and 9 disclose all the claimed limitations.

ALTERNATE REJECTION

29.   Claims 1, 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Johnson et al (US Patent 4,728,869 A) and in view of Gehm et al (US Patent

6,045,331 A)

30.   In Re Claims 1, 2, 10 Johnson et al discloses a method of controlling the drive

motor (M) of a pump (positive displacement type pumps are well known in the art) by

reading the inlet pressure (16), determining the difference from the desired inlet

pressure (set point) and then controlling the speed of the vacuum pump motor

accordingly. The type of controller appears to be a PID controller ("unity gain",

"differential amplifier", "Integrator"). PID controllers are well known in the art and can be

used to vary the speed of the Johnson et al pump to obtain the desired pressure in the

vacuum line. For the basics on PID control theory, visit the following website on the

web -http://en.wikipedia.org/wiki/PID_controller which describes a process variable,

manipulated variable and setpoint. In the instant application, the process variable is the

inlet pressure, the manipulated variable is the speed and the setpoint is the desired

value of the process variable. Johnson et al does not explicitly disclose storing a curve

of speed versus pressure (but it is implied because the speed is controlled accordingly).

31.   Nevertheless, the teachings of Gehm et al clearly disclose specific speeds

associated with specific inlet pressures (steady state) and that higher vacuum

requirements require higher speeds. A proportional controller changes the speed to a

value proportional to the difference between the observed inlet pressure and desired

inlet pressure (error). Therefore, as the inlet pressure approaches the desired pressure

the speed is also adjusted accordingly by the controller. Therefore there is a different

speed value associated with different inlet pressure values. Decisions based on error

are also made by the derivative and integral controllers. The PID controller helps reach

the final pressure more rapidly. Further, Gehm et al discloses in Column 2, Line 25:

"vacuum pumps that have a minimum allowable operating speed", therefore Gehm et al

discloses a first setpoint where pump is operated at minimum speed (reads on constant

lower speed value). Gehm et al also discloses a third setpoint where the pump is

operated at the maximum speed for the electric motor (reads on constant upper speed value). The maximum speed is for pressure values larger than an upper limit pressure and the minimum speed is for pressure values lower than a lower limit pressure. This provides evidence that the motor of Johnson et al has a constant speed in an upper and lower range of pressure. Finally, Gehm et al discloses storing the value of vacuum pressure corresponding to a value of speed that achieves the desired vacuum pressure, for different levels of vacuum pressure as evidenced in Column 4, Lines 17-24.

32.   It would have been obvious to a person having ordinary skill in the art at the time of the invention that if the desired vacuum pressure is below the inlet pressure reading, the controller of Johnson et al increases the speed of the motor initially to and then gradually reduces the speed of the motor as subsequent readings of the inlet pressure approaches the desired vacuum pressure to match the appropriate pressure versus speed values as taught by Gehm et al because that is how a PID controller works. The speed signal is determined based on the difference in the reading and desired value of vacuum pressure, therefore for every value of inlet pressure there is a corresponding speed value. Note that calibrating a curve of pressure versus speed from the readings is ordinary skill in the art. The operating range of speeds of the motor reads on the alteration range as claimed.

Response to Arguments

33.   Applicant has argued that the principle of Barnitz differs from the alteration range

set forth in the claims of the present application in which different speed values are

associated with different inlet pressure values in order to reach the final pressure more

rapidly.

34.   Examiner's response: Barnitz clearly ATTEMPTS to reach the final pressure

more rapidly by operating the pump at maximum capacity at startup. (column 5, Lines

36-38). However, Barnitz does not insist that the pump continues to be operated at

maximum capacity once the pressure has dropped below 500 mm of Hg: " speed of

pump 14 is VARIED to adjust the pressure in the vacuum line to the desired value "

(Column 4, Lines 54-58). The startup procedure as implied by Barnitz et al as

supported by Gehm et al reads on what happens in the alteration range of the present

application as demonstrated by the following example: Assume that an operator wants

the final pressure to be 200 mm of Hg (adjustable value between 100 and 500 mm of

Hg). At startup, in accordance with the teachings of Barnitz et al, the pump will be

operated at full speed (maximum capacity) until the pressure drops to 500 mm. Once

the pressure reaches 500 mm, the speed will be reduced from its maximum value to a

value that supports a steady state pressure of 200 mm of Hg. Hereafter, the speed

corresponding to 200 mm Hg will be referred to as n200. Barnitz et al does not disclose

how the speed is reduced from the maximum to n200, nevertheless Gehm et al

discloses that "The motor is slowed down in 1 Hz increments at a rate of 1 increment

every 10 seconds" (Column 4, Line 23). It would have been obvious to an operator

having ordinary skill in the art at the time of the invention to reduce the speed from its

maximum value in 1 Hz increments at the rate of 1 increment every 10 seconds until

n200 is reached. Note that during this time, the inlet pressure will continue to drop from

500 mm of Hg to 200 mm of Hg. Therefore, for every value of decremented speed,

there will be a corresponding value of inlet pressure (somewhere between 500 mm and

200 mm). Therefore Barnitz et al modified by Gehm et al does not teach operating the

pump at maximum capacity ALL THE WAY until desired vacuum pressure is reached.

Note also that Barnitz et al allows for changing the setpoint, for example, if the operator

wants a new setpoint of 400 mm Hg instead of 200 mm of Hg (still in the range of 100-

500 mm of Hg). In that case, the teachings of Gehm et al clearly disclose storing

different values of steady state pressure corresponding to different values of speed. As

suggested by Gehm et al, the operator will decrease the speed of the motor in 1 Hz

increments (and not abruptly) with each increment having a corresponding value of inlet

pressure until the vacuum level drops 0.2" or 5.08 mm Hg which brings the pressure

from 200 mm to 205.08 mm of Hg. The procedure is repeated until the pressure

reaches 400 mm of Hg. Once again there is a speed value corresponding to each inlet

pressure value. For these reasons, on startup, it would also be obvious to read the inlet

pressure once it reaches 500 mm and reduce the speed according to a pre-calibrated

curve for all the intermediate points until the desired vacuum pressure (and

corresponding speed) is reached.

Here are some additional references: Urich et al (US Patent 6,425,883 B1, see Prior art

of Record in the conclusions section) discloses that in a vacuum pumping system,

"reduction in pump speed lowers the rate at which the vacuum pressure decreases while the aspiration line is occluded" (Column 1, Lines 56-57). It would be obvious to gradually reduce the pump speed of Barnitz et al on startup after the pressure reaches 500 mm of Hg for the purpose of preventing overshoot of the final pressure.

The website http://www.knf.com/knflibrary/magwirelesssc920.htm discloses: "If there is a difference between the actual pressure and the setpoint pressure, the pumping speed is increased to speed up the process. As the actual pressure approaches the setpoint pressure, the pumping speed slows. This ensures fast process times with exceptional accuracy and repeatability".

35.   Applicant has argued that in Gehm et al, the values of inlet pressure are not at all associated with corresponding speed values.

36.   Examiner's Response: The "vacuum level" of Gehm et al corresponds to the inlet pressure, and the speed of operation at that "vacuum level" is the corresponding speed value, see Column 4, Lines 18-19. Column 4, Lines 23-24 disclose a different vacuum level corresponding to a reduced speed value.

37.   All of applicant's arguments have been carefully considered, however they are

not persuasive for the above reasons. The examiner therefore respectfully disagrees

with the applicant and maintains that the application is not in condition for allowance.

Conclusion

38.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure. Urich et al (US Patent 6,425,883 B1) discloses that in a vacuum

pumping system, "reduction in pump speed lowers the rate at which the vacuum

pressure decreases while the aspiration line is occluded" (Column 1, Lines 56-57).

39.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to DNYANESH KASTURE whose telephone number is

(571)270-3928. The examiner can normally be reached on Mon-Fri, 9:00 AM to 4:00

PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Devon Kramer can be reached on (571) 272 - 7118. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
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DGK